

Thermal Diagnostics with SDO/AIA: Applying a Validated Method to Studying Eruptive Active Regions

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The ability to track the thermal evolution of plasma in the Sun's corona is essential for understanding how stored free magnetic energy is converted into thermal energy during eruptive events. We present a new method for performing differential emission measure (DEM) inversions using AIA imaging data. This method has been validated against a diverse set of thermal models of varying complexity and realism. These include (1) idealized gaussian DEM distributions, (2) 3D models of Active Region 11158 comprising quasi-steady loop atmospheres in a non-linear force-free field, and (3) thermodynamic models from a fully-compressible, 3D MHD simulation of AR corona formation following magnetic flux emergence. We then present results from the application of the validated method to studying observed ARs. Finally, we show that synthetic Hinode/XRT images from inversions using AIA data have good match with actual observed images in a broad range of XRT channels.